

Refrigerator

IKE 458-5-4T

IKE 4580-1-4T



Service Manual: H8-74-09

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# Contents

1.	Safety Instructions4			
2.	Repair Instructions5			
3.	Introduction5			
4.	The A	ppliance at a Glance	6	
5.		ow		
6.	Electr	ic System	8	
	6.1	Option for the electronic compressor	9	
7.	Main	Functions and Features	. 10	
	7.1 7.2 7.3 7.4 7.5 7.6 7.7 7.8 7.9 7.10	Normal (freezer) Defrost (freezer) Finned-type evaporator fan FROSTMATIC function (rapid freezing) COOLMATIC function (rapid cooling) D.A.C. function Fault in the freezer air temperature probe Fault in the refrigerator air temperature probe Technical features of the NTC sensor Alarms 7.10.1 Freezer temperature alarm 7.10.2 Freezer door open alarm	10 11 11 11 12 12 13 14	
8.	Test F	Programme (Freezer)		
8.	8.1	Starting the test programme	. 15	
8.	8.1 8.2	Starting the test programme Ending the test programme	. 15 . 15	
	8.1 8.2 8.3	Starting the test programme Ending the test programme Test programme functions	. 15 . 15 . 15	
8. 9.	8.1 8.2 8.3 Acces	Starting the test programme Ending the test programme Test programme functions	15 15 15 15	
	8.1 8.2 8.3 <b>Acces</b> 9.1	Starting the test programme Ending the test programme Test programme functions ssing Individual Components Overview	15 15 15 <b>17</b>	
	8.1 8.2 8.3 <b>Acces</b> 9.1 9.2	Starting the test programme Ending the test programme Test programme functions ssing Individual Components Overview Freezer	15 15 15 <b>17</b> 17	
	8.1 8.2 8.3 <b>Access</b> 9.1 9.2 9.3	Starting the test programme Ending the test programme Test programme functions ssing Individual Components Overview Freezer Flap thermostat	15 15 15 <b>17</b> 17	
	8.1 8.2 8.3 <b>Acces</b> 9.1 9.2	Starting the test programme Ending the test programme Test programme functions ssing Individual Components Overview Freezer	. 15 . 15 . 15 . <b>17</b> . 17 . 18 . 18 . 19	
	8.1 8.2 8.3 <b>Acces</b> 9.1 9.2 9.3 9.4	Starting the test programme Ending the test programme Test programme functions ssing Individual Components Overview Freezer Flap thermostat Defrost resistor	15 15 15 17 17 17 18 18 18	
	8.1 8.2 8.3 <b>Access</b> 9.1 9.2 9.3 9.4 9.5	Starting the test programme Ending the test programme Test programme functions ssing Individual Components Overview Freezer Flap thermostat Defrost resistor Condensation water channel resistor	15 15 15 17 17 18 18 19 19 20	
	8.1 8.2 8.3 <b>Access</b> 9.1 9.2 9.3 9.4 9.5 9.6 9.7 9.8	Starting the test programme Ending the test programme Test programme functions Ssing Individual Components Overview Freezer Flap thermostat Defrost resistor Condensation water channel resistor Finned-type evaporator fan	15 15 15 17 17 18 18 19 20 20	
	8.1 8.2 8.3 <b>Access</b> 9.1 9.2 9.3 9.4 9.5 9.6 9.7 9.8 9.9	Starting the test programme Ending the test programme Test programme functions ssing Individual Components Overview Freezer Flap thermostat Defrost resistor Condensation water channel resistor Finned-type evaporator fan Thermal switch Rubber valve Control panel	15 15 15 17 17 18 19 20 20 21	
	8.1 8.2 8.3 <b>Access</b> 9.1 9.2 9.3 9.4 9.5 9.6 9.7 9.8 9.9 9.10	Starting the test programme Ending the test programme Test programme functions Ssing Individual Components Overview Freezer Flap thermostat Defrost resistor Condensation water channel resistor Finned-type evaporator fan Thermal switch Rubber valve Control panel Electronic units	15 15 15 17 17 18 19 20 20 20 21 21	
	8.1 8.2 8.3 9.1 9.2 9.3 9.4 9.5 9.6 9.7 9.8 9.9 9.10 9.11	Starting the test programme Ending the test programme Test programme functions Ssing Individual Components Overview Freezer Flap thermostat Defrost resistor Condensation water channel resistor Finned-type evaporator fan Thermal switch Rubber valve Control panel Electronic units Freezer electronic unit	. 15 . 15 . 15 . 17 . 17 . 17 . 17 . 17 . 17 . 17 . 18 . 19 . 20 . 20 . 20 . 21 . 21 . 22	
	8.1 8.2 8.3 <b>Access</b> 9.1 9.2 9.3 9.4 9.5 9.6 9.7 9.8 9.9 9.10 9.11 9.12	Starting the test programme Ending the test programme Test programme functions Ssing Individual Components Overview Freezer Flap thermostat Defrost resistor Condensation water channel resistor Finned-type evaporator fan Thermal switch Rubber valve Control panel Electronic units Freezer electronic unit Refrigerator electronic unit	. 15 . 15 . 15 . 17 . 17 . 17 . 18 . 19 . 19 . 20 . 20 . 20 . 21 . 21 . 22 . 24	
9.	8.1 8.2 8.3 <b>Access</b> 9.1 9.2 9.3 9.4 9.5 9.6 9.7 9.8 9.9 9.10 9.11 9.12 9.13	Starting the test programme Ending the test programme Test programme functions ssing Individual Components Overview Freezer Flap thermostat Defrost resistor Condensation water channel resistor Finned-type evaporator fan Thermal switch Rubber valve Control panel Electronic units Freezer electronic unit Refrigerator electronic unit Compressor section	15 15 15 17 18 18 19 20 20 20 20 20 20 20 21 22 22 24 26	
9.	8.1 8.2 8.3 <b>Access</b> 9.1 9.2 9.3 9.4 9.5 9.6 9.7 9.8 9.9 9.10 9.11 9.12 9.13	Starting the test programme Ending the test programme Test programme functions Ssing Individual Components Overview Freezer Flap thermostat Defrost resistor Condensation water channel resistor Finned-type evaporator fan Thermal switch Rubber valve Control panel Electronic units Freezer electronic unit Refrigerator electronic unit	15 15 15 17 18 18 19 20 20 20 20 20 20 20 21 22 22 24 26	
9.	8.1 8.2 8.3 <b>Access</b> 9.1 9.2 9.3 9.4 9.5 9.6 9.7 9.8 9.9 9.10 9.11 9.12 9.13	Starting the test programme Ending the test programme Test programme functions ssing Individual Components Overview Freezer Flap thermostat Defrost resistor Condensation water channel resistor Finned-type evaporator fan Thermal switch Rubber valve Control panel Electronic units Freezer electronic unit Refrigerator electronic unit Compressor section	15 15 15 17 18 19 20 21 21 22 21 22 24 22 24 26 <b>28</b>	
9.	8.1 8.2 8.3 <b>Access</b> 9.1 9.2 9.3 9.4 9.5 9.6 9.7 9.8 9.9 9.10 9.11 9.12 9.13 <b>Displa</b>	Starting the test programme Ending the test programme Test programme functions ssing Individual Components Overview Freezer Flap thermostat Defrost resistor Condensation water channel resistor Finned-type evaporator fan Thermal switch Rubber valve Control panel Electronic units Freezer electronic unit Refrigerator electronic unit Refrigerator electronic unit Compressor section	15 15 15 17 18 18 19 20 20 20 20 20 20 20 20 20 20 20 20 20	

# 1. Safety Instructions

#### Danger!



Repairs may only be carried out by a qualified electrician! Improper repairs can be extremely dangerous for the user.

#### It is essential that you observe the following instructions in order to prevent electric shocks:

- The casing and the frame may be live in the event of faults!
- Touching live components inside the appliance may cause dangerous currents to flow through your body!
- Disconnect the appliance from the mains prior to carrying out any repair work!
- When inspecting live parts, a residual current circuit breaker must always be used!
- Always ensure that an earthed conductor is properly connected! The ground wire resistance must not
  exceed that specified in the standard! It is of vital importance for ensuring the safety of people and
  the functioning of the appliance.
- On completion of repairs, an inspection must be carried out in accordance with VDE 0701 [Association of German Electrical Engineers] or the corresponding regulations for your country!
- Do not touch any of the components in the appliance. The modules are also live!
- Observe instructions on electrostatic hazards!
- Wear safety goggles and protective gloves when handling refrigerants. Rinse your eyes with a lot of water if refrigerant splashes into them.



### Attention!

Make sure you observe the following instructions:

• The appliances must be disconnected from the mains prior to all repairs. If inspections must be carried out on live appliances, make sure you use a residual current operated device.



Sharp edges: Use protective gloves.



Components may be electrostatic! Observe handling precautions!

# 2. Repair Instructions

- Never attempt to carry out repairs by "randomly replacing" components!
- Always proceed systematically and observe the technical documentation that goes with the appliance!
- Electronic circuit boards are generally not repaired; instead they are completely replaced with original spare parts. Exceptions are documented separately.
- Pipe connections in cooling circuits are not to be soldered. Lokring connections are to be used.
- · Carry out a leak test and a functional test on the cooling circuit.
- The dehumidifier is to be replaced before evacuation and filling during any intervention in the cooling circuit.
- It is essential to replace the compressor and the dehumidifier when repair work resulting from suction leaks in the cooling circuit is carried out. Humidity which gets into the cooling circuit will cause irreparable damage to the oil in the compressor.

# 3. Introduction

This manual is for electronic 4-door refrigerators fitted with an ERF2021 MINIDIGIT electronic unit, which is produced in the "ZS" denoted plant in Susegana.

This model differs from its predecessor in that it has ERF2000 5ACS and ERF2021 MINIDIGIT electronic units, which resulted in a change in the electric wiring and the service mode.

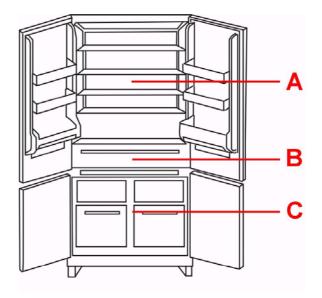
# 4. The Appliance at a Glance

The refrigerator with 4 DOORS has 3 cooling zones for the best storage of any kind of food:

#### A Refrigerator

The natural circulation of air guarantees the temperatures and humidity levels essential for the proper storage of fresh food in the refrigerator.

Temperatures are controlled with the ERF2021 electronic unit located on the right-hand side of the control panel (this electronic unit is a single component, since the electronic power unit and the electronic display unit are connected to one another with a flat cable whose terminals are soldered onto the electronic units).



# B Zero-degree zone B (only for some models)

This zone has even temperatures of between 0 °C and +3 °C. Refrigeration is carried out by means of the enforced convection of air from the freezer located below this zone.

Temperatures are controlled with a flap thermostat which opens and closes the opening through which the air coming from the freezer flows.

#### C Freezer

Cold is generated by a battery-driven evaporator, while the air is actively circulated with a fan.

This means that the circulating moist air in the form of frost only condenses on the evaporator and not on the walls of the freezer or on packages of food.

The electronic unit regularly activates a defrost resistor (approx. every 14 hours) which thaws the frost that has built up.

Temperatures are controlled with the ERF2000 5ACS electronic unit located on the right-hand side of the control panel (this electronic unit is made up of two components, since the electronic power unit and the electronic display unit with connectors are connected to one another with a flat cable).

The appliance has two compressors and two separate cooling circuits:

- 1. Refrigerator cooling circuit;
- 2. Cooling circuit of the zero-degree zone and the freezer.

### 5. Air Flow

#### Freezer

The cold produced by the battery-driven evaporator is put into circulation by the fan, which is located above the battery.

The air flows into the right-hand section of the freezer and flows out again through two slits.

#### Zero-degree zone

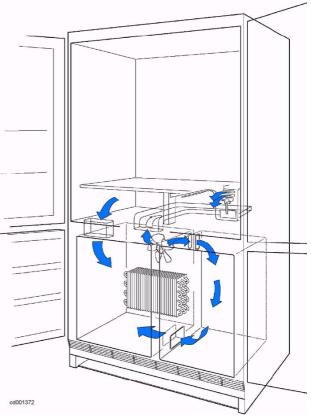
The air flows in through a foamed channel located above the fan and flows out through the flap thermostat slits.

The air can flow back into the freezer section through a slit on the bottom left of the zero-degree zone.

The temperature is regulated by the flap thermostat.

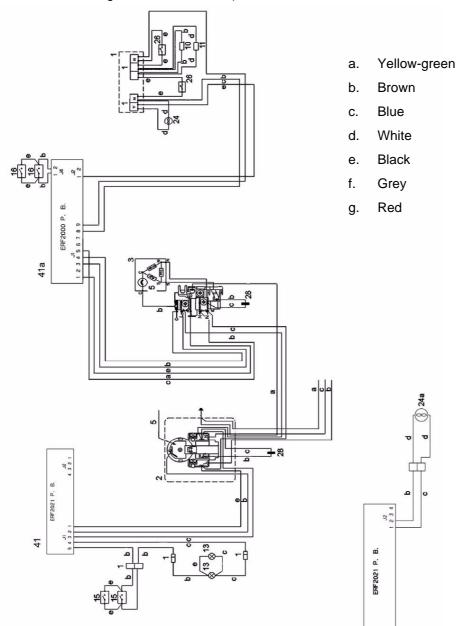
#### Refrigerator

The air is circulated by means of natural air convection.



# 6. Electric System

(Observe the circuit diagram for each model!)

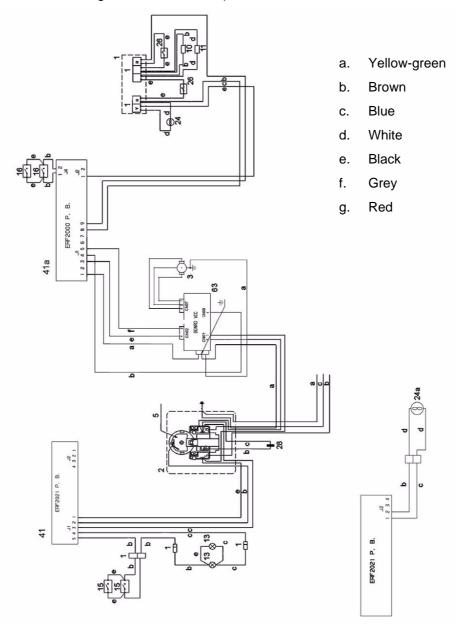


- 2 Refrigerator compressor
- 3 Freezer compressor
- 5 Motor protection
- 10 Defrost resistor
- 11 Condensation water channel resistor
- 13 Refrigerator lamp
- 15 Refrigerator door switch
- 16 Freezer door switch

- 24 Finned-type evaporator fan
- 24a D.A.C. fan
- 26 Thermal circuit breaker (+40°C)
- 28 Operating capacitor (only for models for which this has been provided)
- 41 Refrigerator electronic unit (ERF2021)
- 41 Freezer electronic unit (ERF2000 5ACS)

### 6.1 Option for the electronic compressor

(Observe the circuit diagram for each model!)



- 2 Refrigerator compressor
- 3 Freezer compressor
- 5 Motor protection
- 10 Defrost resistor
- 11 Condensation water channel resistor
- 13 Refrigerator lamp
- 15 Refrigerator door switch
- 16 Freezer door switch

- 24 Finned-type evaporator fan
- 24a D.A.C. fan
- 26 Thermal circuit breaker (+40°C)
- 28 Operating capacitor (only for models for which this has been provided)
- 41 Refrigerator electronic unit (ERF2021)
- 41 Freezer electronic unit (ERF2000 5ACS)

Küppersbusch

63 VCC electronic control unit

## 7. Main Functions and Features

### 7.1 Normal (freezer)

The air circulation ensures that moisture in the freezer is collected on the evaporator battery, thus preventing frost from building up on the food.

During normal operating times, the ERF2000 5ACS freezer electronic system powers the electric circuit of the freezer compressor and the fan of the finned-type evaporator.

The fan is switched on and off with a delay of 2 minutes after the compressor.

The operating time equivalent to the time span between the defrost phases operated in sequence is approx. 14 hours when the doors are opened normally (this time may be up to 71 hours when a door is never opened!).

### 7.2 Defrost (freezer)

The moisture inside the appliance will all be deposited on the evaporator, which is the coldest part of the refrigerator; this is why the ice present on the battery needs to be defrosted at regular intervals, at least every 14 hours when the door is opened normally (if the door is never opened, defrosting will only need to be carried out after 71 hours).

The electronic system cuts off the electric circuit which feeds the freezer compressor and the fan of the finned-type evaporator, and powers the electric circuit of the defrost resistors for at least 20 minutes.

The heat generated by the defroster heating element will not have any effect on the temperature in the freezer or on the temperature of packages of food, since all the thermal energy is used for defrosting the ice present on the evaporator.

The electronic system will determine the temperature of the battery-driven evaporator after 20 minutes and will cut off the power supply to the defrost resistor when it reaches +10°C.

The electronic system will start operating the compressor again after a delay of 5 minutes.

The fan will also be switched on again following a further delay of 2 minutes, when the air has already become cold.

If the electronic system does not cut off the power supply to the defrost resistors for any reason, and if the battery temperature rises to +40°C, the resistors will be switched off by the thermal safety switches.

If the thermal switch has not switched the defrost resistors off half an hour after commencement of defrosting, the electronic system will always deactivate the defrost resistors and will allow normal operation to continue.

### 7.3 Finned-type evaporator fan

If the freezer doors are not opened, the fan of the finned-type evaporator will operate when the compressor operates (the fan will be deactivated after a delay of 2 minutes when the compressor is switched off).

When the finned-type evaporator fan is operating and one of the two freezer doors is opened, the fan will be switched off (it is re-activated when the doors are closed again).

When the fan of the battery-driven evaporator is not operating and one of the two freezer doors is opened, the fan will be switched on for two minutes when the door is closed again.

### 7.4 **FROSTMATIC** function (rapid freezing)

The FROSTMATIC function (rapid freezing) is activated when the appropriate key is pressed, which means that:

- the control lamp allocated to the FROSTMATIC function will light up;
- SP will be indicated on the display;
- the compressor will operate continuously for approx. 52 hours and will then be switched off automatically.

Press the relevant key to deactivate the FROSTMATIC function.

### 7.5 COOLMATIC function (rapid cooling)

The COOLMATIC function (rapid cooling) is activated when the appropriate key is pressed, which means that:

- the control lamp allocated to the COOLMATIC function will light up;
- the compressor will operate in the thermostatic operating mode for about 6 hours instead of in continuous operation (as if the temperature key had been set at Max, in order to reach +2°C) and will then be switched off automatically;
- the D.A.C. is switched on (if existing);
- the control lamp allocated to the D.A.C. function does not light up.

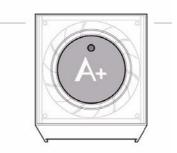
Press the relevant key to deactivate the COOLMATIC function.

### 7.6 D.A.C. function

The D.A.C. function is activated by pressing the relevant key on the control panel.

It is advisable to activate the D.A.C. function when the room temperature exceeds 25  $^{\circ}\text{C}.$ 

The D.A.C. function is automatically activated when the COOLMATIC function is selected (rapid cooling).



### 7.7 Fault in the freezer air temperature probe

If the NTC temperature probe develops a fault during normal operation (the signal emitted by the probe is not within the limits):

- the appliance will carry out a pre-defined programme run during which the freezer compressor will alternately be powered for 40 minutes and switched off for 40 minutes
- the display will show one of the following codes:



Air temperature probe of the freezer defect



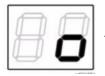
Temperature probe of the finned-type evaporator in the freezer defect

When the probe functions properly again, the two operating conditions defined above will be discontinued.

### 7.8 Fault in the refrigerator air temperature probe

If the NTC temperature probe develops a fault during normal operation (the signal emitted by the probe is not within the limits):

- the appliance will carry out a pre-defined program run during which the refrigerator compressor will alternately be powered for 30 minutes and switched off for 40 minutes
- the display will show one of the following codes:



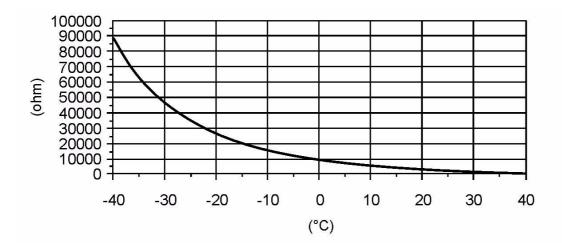
Air temperature probe of the refrigerator defect

When the probe functions properly again, the two operating conditions defined above will be discontinued.

### 7.9 Technical features of the NTC sensor

The temperature probes are all the same type. Their technical features are as follows:

Temperature	Resistance	Temperature	Resistance	Temperature	Resistance
[°C]	[ohm]	[°C]	[ohm]	[°C]	[ohm]
- 40	90721	- 13	17506	14	4414
- 39	84867	- 12	16564	15	4213
- 38	79431	- 11	15678	16	4022
- 37	74381	- 10	14845	17	3840
- 36	69686	- 9	14059	18	3668
- 35	65320	- 8	13320	19	3505
- 34	61258	- 7	12624	20	3350
- 33	57475	- 6	11969	21	3202
- 32	53952	- 5	11352	22	3062
- 31	50668	- 4	10770	23	2929
- 30	47606	- 3	10222	24	2802
- 29	44735	- 2	9705	25	2682
- 28	42056	- 1	9218	26	2567
- 27	39556	0	8758	27	2458
- 26	37221	1	8322	28	2354
- 25	35039	2	7911	29	2255
- 24	32999	3	7523	30	2161
- 23	31092	4	7156	31	2071
- 22	29307	5	6809	32	1985
- 21	27637	6	6481	33	1904
- 20	26072	7	6171	34	1826
- 19	24600	8	5877	35	1752
- 18	23221	9	5600	36	1681
- 17	21928	10	5337	37	1614
- 16	20715	11	5087	38	1549
- 15	19577	12	4851	39	1488
- 14	18509	13	4626	40	1429



### 7.10 Alarms

#### 7.10.1 Freezer temperature alarm

The temperature alarm is activated when the temperature in the freezer reaches -8°C:

- The control lamp allocated to the alarm blinks
- The temperature display blinks

Press the key for deactivating the alarm to:

• Display the highest temperature reached in the freezer for 5 seconds

The control lamp of the alarm continues to blink and goes off automatically when the temperature drops again.

What happens after a power failure when normal operating conditions are restored again and the key to deactivate the alarm was not pressed:

- The temperature display blinks
- The control lamp allocated to the alarm blinks.

When the key for deactivating the alarm is pressed:

- The highest temperature reached in the freezer is displayed for 5 seconds
- The temperature display stops blinking
- The alarm control lamp is switched off.

#### 7.10.2 Freezer door open alarm

If one of the two freezer doors is left open for longer than 80 seconds:

- The control lamp allocated to the alarm blinks
- The temperature display blinks

The alarm control lamp goes off when the doors have been closed.

# 8. Test Programme (Freezer)

### 8.1 Starting the test programme

Proceed as follows to start the test programme:

- 1. Put the plug into the socket.
- 2. Open the freezer doors.
- 3. Switch the appliance off with the ON/OFF key (both the freezer and the refrigerator).
- 4. Press the two keys for "Deactivate alarm" and "FROSTMATIC function" simultaneously within 10 seconds of the appliance being connected to the mains power supply.

An acoustic buzzer signal will sound for one second to confirm that the test programme has been switched on and:

- All the electronic display unit LEDs will light up;
- All the display segments of the electronic display unit will light up (the digits 88 will be shown).



### 8.2 Ending the test programme

The test programme will be finished when one of the following requirements has been met:

- a. Pull the plug out of the socket and put it in again.
- b. 40 minutes have passed and no key was pressed.
- c. The final phase of the test programme was reached.

### 8.3 Test programme functions

Press the key for the FROSTMATIC function (rapid freezing) to move forward to the next phase in the procedure.

Press the ON/OFF key to activate/deactivate the loads (compressor, defrost resistor and fan).

List of the test programme phases:

- 1. The display LEDs and segments are all switched on.
- 2. The display LEDs and segments are all switched off.
- The display7 shows 0 and the load regulated by the acs TH1 [compressor] is checked. Press the ON/OFF key to activate/deactivate the load (the load is activated when the alarm LEDs and the FROSTMATIC function are switched on).



- 4. The display shows 1 and the load regulated by the acs TH2 [not used for this appliance] is checked.
- 5. \*The display shows 2 and the load regulated by the acs TH3 [defrost resistor] is checked. Press the ON/OFF key to activate/deactivate the load (the load is activated when the alarm LEDs and the FROSTMATIC function are switched on).
- \*The display shows 3 and the load regulated by the acs TH4 [finned-type evaporator fan] is checked.
   Press the ON/OFF key to activate/deactivate the load (the load is activated when the alarm LEDs and the FROSTMATIC function are switched on).
- 7. The display shows 4 and the load regulated by the acs TH5 [not used for this appliance] is checked.

#### Please note:

When the procedure moves into the next phase, the load will maintain its status (e.g. when the compressor has been activated, it will remain active for the following phases) when the key for the FROSTMATIC function is pressed (rapid freezing). This makes it possible to check the loads at the same time.

8. Checking the doors

The tenth digit on the display is allocated to the two freezer doors. When one of the two freezer doors is left open, a 1 will appear, and when both door switches have been activated a 0 will appear (the door switches are connected in parallel!).

9. Checking the counter

The display shows a rising number in one-second cycles. This counter is used by the electronic system for its internal control.

10. Checking the temperature probes.

The display will show one of the following codes:

Code	Description
E0	No error
E1	Evaporator probe defect
E2	Room temperature probe defect (mounted on the electronic display unit)
E4	Room temperature probe defect (mounted on the electronic power unit)
E5	0 zone probe defect

#### Please note:

The errors for the air probes of the freezer are already shown during normal operation. Now all the phases for testing the loads have been displayed, and the test programme should be interrupted by switching the appliance off and switching it on again.

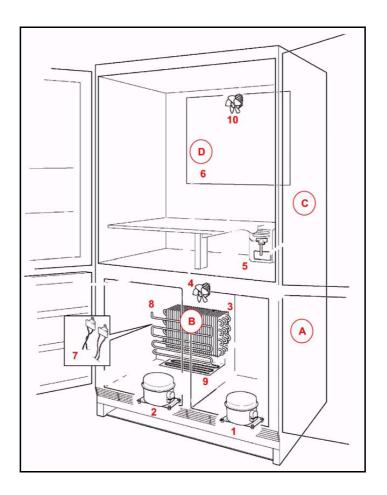
#### Please note:

If the test programme is not to be stopped, the programme will run with some phases intended for the factory only. These phases should be ignored.

In this case the test programme will also end when the appliance is switched off and then switched on again.

# 9. Accessing Individual Components

### 9.1 Overview



#### Legend:

- 1. Refrigerator compressor
- 2. Freezer compressor
- 3. Finned-type evaporator
- 4. Finned-type evaporator fan
- 5. Flap thermostat (only for some models)
- 6. Refrigerator recessed evaporator
- 7. Thermal protector
- 8. Defrost resistor
- 9. Condensation water channel resistor
- 10. D.A.C. (only for some models)

The cables for sensors A, B, C and D are foamed into the interior of the casing so they cannot be replaced (for more information see the Service Manual for the H8-74-05).

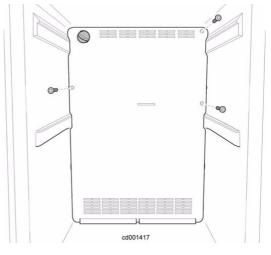
- A Freezer NTC sensor
- B Finned-type evaporator NTC sensor
- C Refrigerator NTC sensor
- D Refrigerator evaporator NTC sensor

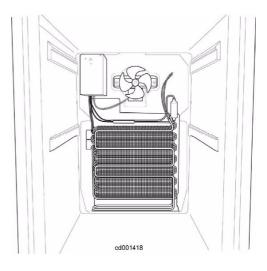


### 9.2 Freezer

Proceed as follows in order to access the freezer section component parts:

- 1. Remove the drawers for the frozen food from their guides.
- 2. Remove the three screws of the cover and remove it sideways.





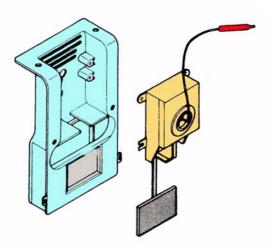
### 9.3 Flap thermostat

A flap thermostat is located in a transparent protective housing at the back of the zero-degree zone.

The thermostat opens or closes the opening through which the air streams from the freezer located below the zero-degree zone.

Position min.	+2.5 °C
Position max.	-3.5 °C

- 1. Unhook the thermostat bulb and then
- 2. screw out the screws with which the thermostat is attached to the cell.



### 9.4 Defrost resistor

The ice which builds up on the evaporator needs to be defrosted at regular intervals. Approximately every 14 hours, the freezer electronic system activates a resistor operating at 190 watts (resistance: 303 ohms; voltage: 240 volts) which has direct contact to the battery.

1. Remove the screws with which the finned-type evaporator is fastened to the bottom of the cell.

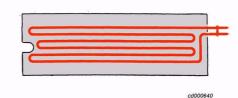
2. Carefully tilt the battery, making sure that the leads are not damaged.

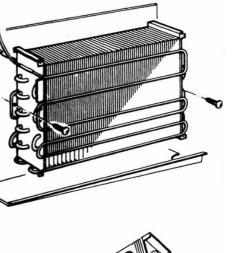
The resistor is engaged in the slots in the ribs of the battery.

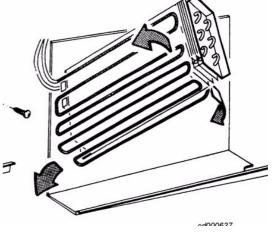
### 9.5 Condensation water channel resistor

In order to prevent condensation water from turning into ice, a 21.5-watt resistor (resistance: 2679 ohms, voltage: 240 V) has been connected under the condensation water channel.

This resistor is connected in parallel to the defrost resistor.





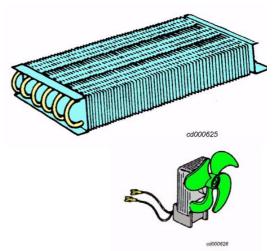


### 9.6 Finned-type evaporator fan

The battery-operated evaporator cools extremely well despite taking up little space.

This is made possible because the surface of the evaporator has been enlarged by numerous aluminium ribs installed in a zinc serpentine tube.

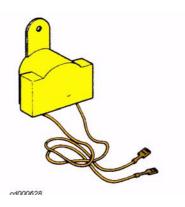
An active circulation of air (power output: 3.1 watts, velocity: 2400 rpm), generated by a fan installed above the evaporator ensures that all of the humidity present is deposited on the evaporator, which is the coldest part of the interior of the appliance.



### 9.7 Thermal switch

Two overheat control switches of the same type with direct contact to the battery cut off the power supply to the defrost resistor in the case of:

- +40°C circuit-breaker (cable colour: black);
- +40°C circuit-breaker (cable colour: black).



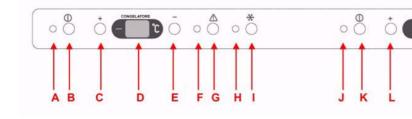
### 9.8 Rubber valve

The condensation water is let off through a silicone plastic valve located in the condensation water drainage hole.

The design of the valve enables condensation water to flow out freely; on the other hand, during the cooling phase, the valve closes due to the suction which is produced in the inside of the appliance, hence preventing moist air from the outside from being sucked in.



### 9.9 Control panel



#### Freezer legend:

- A ON/OFF control lamp
- B Freezer ON/OFF key
- C Raise temperature key (+)
- D Freezer temperature display
- E Lower temperature key (-)
- F Alarm control lamp
- G Key for switching off the alarm
- H FROSTMATIC function control lamp (rapid freezing)
- I FROSTMATIC function key (rapid freezing)

#### **Refrigerator legend:**

- J ON/OFF control lamp
- K Refrigerator ON/OFF key
- L Raise temperature key (+)
- M Refrigerator temperature display
- N Lower temperature key (-)
- O COOLMATIC (rapid cooling) control lamp

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OP

° 0

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QR

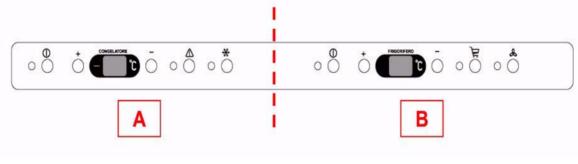
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- P COOLMATIC (rapid cooling) function key
- Q D.A.C. control lamp (only for some models!)
- R D.A.C. function key

### 9.10 Electronic units

The appliance is regulated by two electronic units independently of one another:



A. Freezer electronic unit

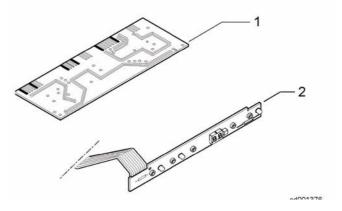
B. Refrigerator electronic unit

### 9.11 Freezer electronic unit

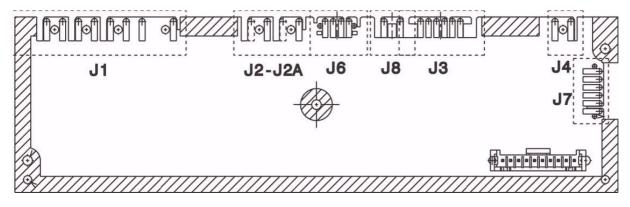
The freezer has a type ERF2000 5ACS electronic unit comprising:

- 1. Electronic power unit
- 2. Electronic display unit

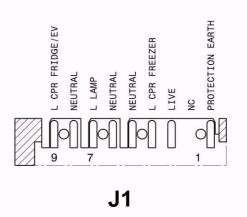
The two electronic units are connected to one another with a connecting flat cable so they are available as individual spare parts.



#### ERF2000 5 ACS electronic power unit



- 1. Earthing contact
- 2. Free
- 3. Cable
- 4. Compressor
- 5. Neutral wire
- 6. Free
- 7. Free
- 8. Defrost resistor neutral wire+fan
- 9. Defrost resistor cable



# J2

- 1. Finned-type evaporator fan cable
- 2. Free

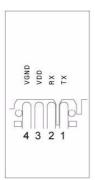
#### J2A

- 1. Free
- 2. Free
- 1. Free
- 2. Free
- 3. Free
- 4. Free

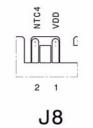


- 2. Free
- 3. Free

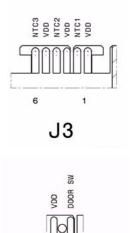








- 1. Free
- 2. Free
- 3. Freezer evaporator temperature probe
- 4. Freezer evaporator temperature probe
- 5. Freezer air temperature probe
- 6. Freezer air temperature probe
- 1. Freezer door switch
- 2. Refrigerator door switch





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2

#### **MINIDIGIT** electronic display unit



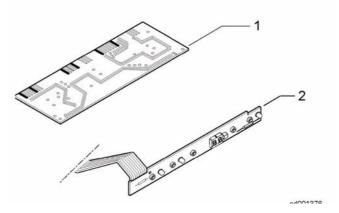
- DS1 FROSTMATIC (rapid freezing) function LED
- DS2 Alarm switch-off LED
- DS3 "–" sign LED
- DS4 Display for showing temperatures
- DS5 Display for showing temperatures
- DS8 ON/OFF LED
- SW1 FROSTMATIC (rapid freezing) function key
- SW2 Alarm switch-off key
- SW3 Key to raise the temperature (+)
- SW4 Key to lower the temperature (-)
- SW5 ON/OFF key
- SW6 Reed element (not applicable for this appliance)

### 9.12 Refrigerator electronic unit

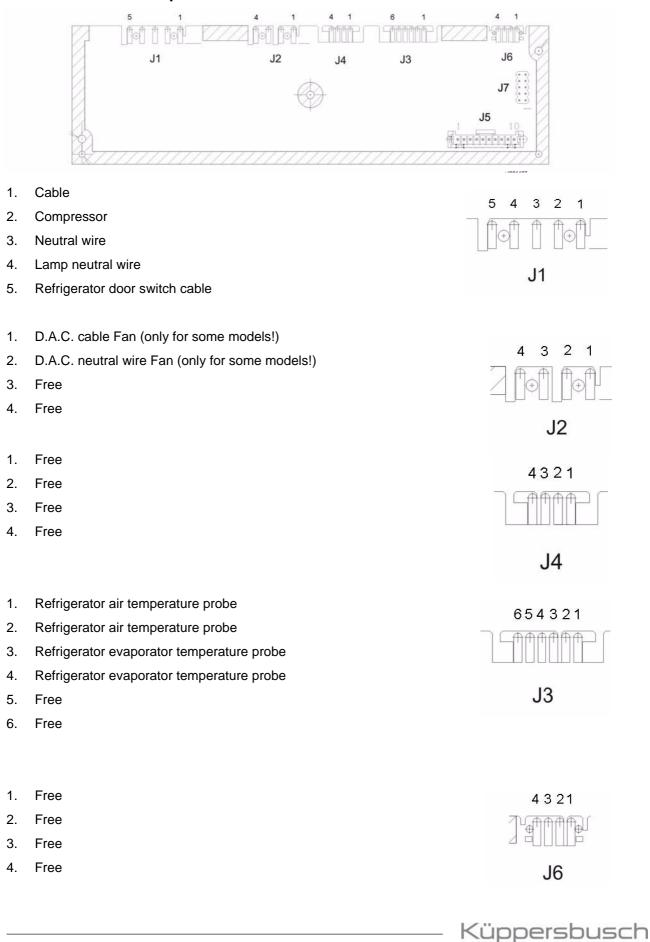
The refrigerator has a type EERF2021 electronic unit comprising:

- 1. Electronic power unit
- 2. Electronic display unit

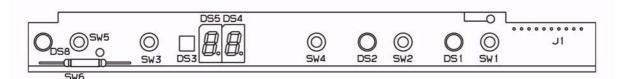
The two electronic units are connected to one another with a connecting flat cable so they are available as individual spare parts.



### EERF2021 electronic power unit



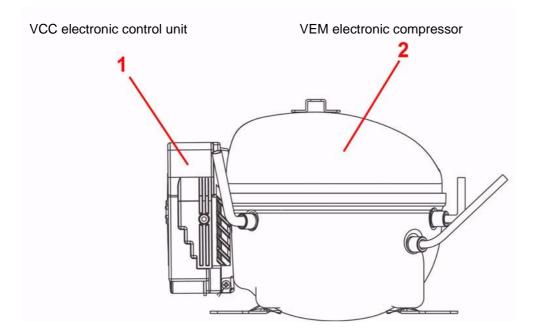
#### **MINIDIGIT** electronic display unit



- DS2 COOLMATIC (rapid cooling) function LED
- DS3 "-" sign LED (not applicable for this appliance)
- DS4 Display for showing temperatures
- DS5 Display for showing temperatures (not applicable for this appliance)
- DS8 ON/OFF LED
- SW1 D.A.C. key (only for some models)
- SW2 COOLMATIC (rapid cooling) function key
- SW3 Key to raise the temperature (+)
- SW4 Key to lower the temperature (-)
- SW5 ON/OFF key
- SW6 Reed element (not applicable for this appliance)

### 9.13 Compressor section

Some models have an electronic type VEM compressor with a VCC electronic control unit



26



### Caution!

A VEM compressor must never be directly connected to the power line since this will cause it to be irreparably damaged!

The power supply to the electronic control unit is NOT cut off when the appliance is switched off with the ON/OFF key.

ALWAYS pull the mains plug out of the socket before any work is carried out on electric components.

Incorrect connections cause the compressor to be irreplaceably damaged!

For this reason the earthing strip must be connected to the earthing contact and the phase sequence observed.

# 10. Display symbols

# 10.1 Refrigerator

DISPLAY	FIGURES	DESCRIPTION
88	NOT BLINKING	The temperature for normal operation in the refrigerator is shown [from +2° to +8°C]
88	BLINKING	The temperature in the refrigerator for the DEMO MODE function is shown [from +2° to +8°C]
80	NOT BLINKING	A fault in the air temperature probe in the refrigerator is shown
Ε	NOT BLINKING	Shown when the electronic systems are not compatible Remedy: Check the electronic unit ET numbers
Ρ	NOT BLINKING	Shown when there is a writing/reading error in the EEP- ROM data Remedy: Change both electronic units (electronic power and electronic display units)

### 10.2 Freezer

88	NOT BLINKING	The temperature for normal operation in the freezer is shown [from -15° to -24°C]
88	BLINKING	The temperature for the DEMO MODE function in the freezer is shown [from -15° to -24°C]
<b>S</b> 8	NOT BLINKING	The FROSTMATIC (rapid freezing) function is shown
80	NOT BLINKING	A fault in the air temperature probe in the freezer is shown
88	NOT BLINKING	A fault in the finned-type evaporator temperature probe in the freezer is shown
Ε	NOT BLINKING	A fault in the finned-type evaporator temperature probe in the freezer is shown
Ρ	NOT BLINKING	A fault in the finned-type evaporator temperature probe in the freezer is shown